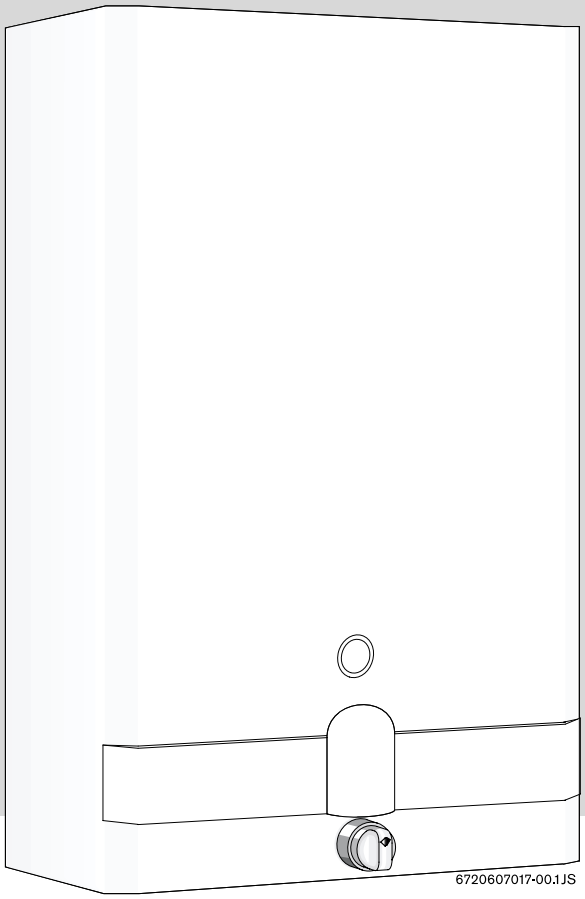
Water heaters for use with Natural and L.P.G.

GWH 425 EF

Flow Modulated with Electronic Ignition and Power Venting
Suitable for heating potable water only - Not approved for space heating purposes
(Intended for variable flow applications with steady cold water inlet temperatures)

BOSCH

PRO TANKLESS



PHCC
PLUMBING-HEATING-COOLING CONTRACTORS ASSOCIATION

GWH-425-EF-N
GWH-425-EF-L

Warning: If the information in this manual is not followed exactly. A fire or explosion may result causing property damage, personal injury or death. Do not store or use gasoline or other flammable vapor and liquids in the vicinity of this or any other appliance.

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.
In the Commonwealth of Massachusetts this product must be installed by a licensed plumber or gas fitter.

Upon completion of the installation, these instructions should be handed to the user of the appliance for future reference.

What to do if you smell gas

- Close gas valve. Open windows.
- Do not try to light any appliance
- Do not touch any electrical switch; do not use any phone in your building
- If you cannot reach your gas supplier, call the fire department.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

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WARNING: Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.
Upon completion of the installation, these instructions should be handed to the user of the appliance for future reference.
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FEATURING: Electronic Ignition and Power Venting

WARNING
If the information in this manual is not followed exactly. A fire or explosion may result causing property damage, personal injury or death.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable, combustible or corrosive vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- **Close gas valve. Open windows.**
- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**
- **Installation and service must be performed by a qualified installer, service agency or the gas supplier.**

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Principle of Operation:
When a hot water faucet is opened, the flow of water through the heater causes the gas valve to open. At the same time a microswitch is activated which sends a spark to the pilot. The flame sensor confirms that the pilot has been lighted and allows the first two burners to ignite. The flame sensor confirms correct activation and all burners ignite. The pilot goes out. The power exhaust system runs as long as the burners are on. The heat exchanger coils absorb the heat generated by the burners and transfer heat to the water. When the hot water faucet is shut off, the gas valve automatically closes and the burners turn off, followed immediately by the exhaust system. Your hot water faucet is an ignition key to turn on the water heater, giving you control over your hot water energy use. Every time you turn off your hot water faucet, the energy consumption for hot water returns to zero.

FEATURES

- Electronic Pilot Ignition
- On/Off switch to activate system
- Power Venting with safety shutoff
- High Quality Materials for Long Working Life.
- Copper heating coils for endless supply of hot water.
- Burner output proportional to hot water flow demand for maximum energy efficiency.
- Safety flame sensor at pilot burner.
- Automatic overheating protection shut-off sensor.
- Stainless steel burners with stabilized blue flame.
- Built-in corrosion resistant power venter.
- Compact space saver: mounts on a wall with two hooks.
- Easily removable one-piece cover.
- Easy one person installation.
- Adjustable water flow restrictor to ensure that water flow demand will not exceed the heating capacity of the heater.

425 EF LP and 425 EF NG Specifications

		425EF NG	425 EF LP
Gas input	max.	130 000 Btu/hr	125 000 Btu/hr
	min.	28 000 Btu/hr	28 000 Btu/hr

Water Connection 1/2” Thread fitting NPT

H x W x D 29 3/4” x 18 1/4” x 8 3/4"

Vent 4”

Gas Connection 1/2” NPT thread

Min. Water Pressure 18 Psi

Max. Water Pressure 150 Psi

Shipping Weight 50.6 LB

Net Weight 44 LB

2.0 GPM at 90° rise

4.0 GPM at 45° rise

Min. Water Flow 1/2 gal/min

120V/60Hz 1.2 Amps

LP GAS Supply Pressure (before 425 EF regulator): min. 11” W.C. / max.14” W.C.*

Required LP GAS pressure at inlet tap while 425 EF is operating: 10.5” W.C.

LP GAS Burner Manifold pressure while 425 EF is operating at maximum input: 9.9” W.C.

Natural Gas Supply Pressure (before 425 EF regulator): min.: 7” W.C. / max.: 14”W.C.*

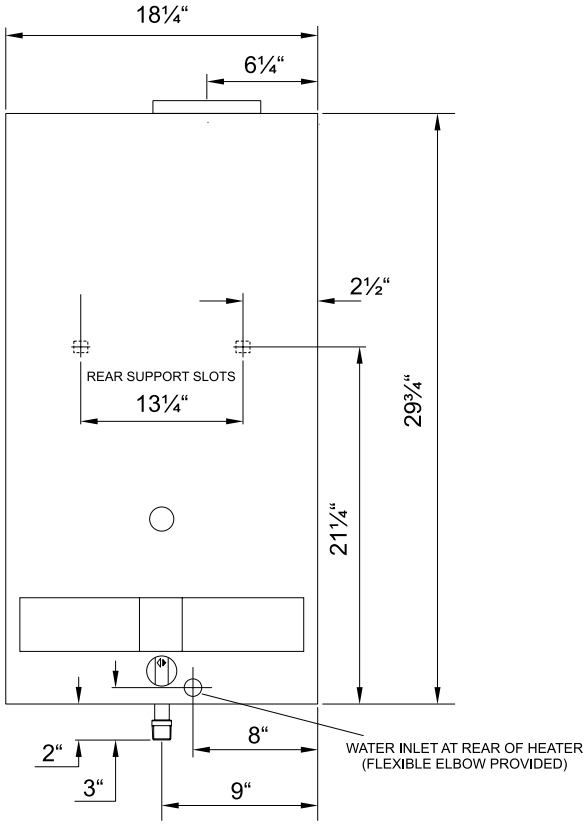
Required Natural Gas Pressure at inlet tap while 425 EF is operating: 5.7”W.C.

Natural Gas Burner Manifold pressure while 425 EF is operating at maximum input: 5.38” W.C.

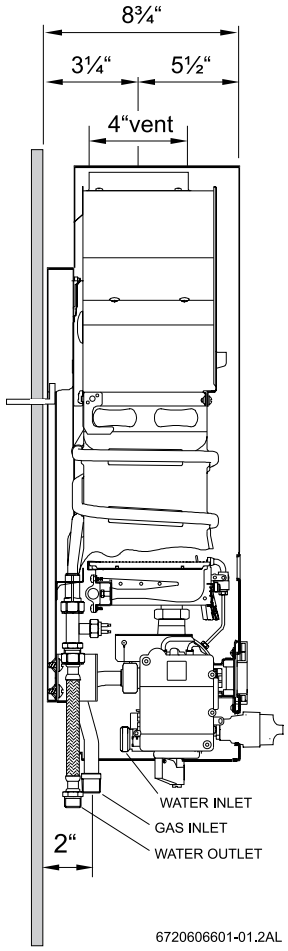
* Inlet gas pressure before 425 EF regulator must not exceed this value. Pressure may need to be adjusted for high altitudes, see page 11.

UNPACKING THE 425 EF HEATER

This heater is packed securely. The box includes one water connection fitting, a control knob with collar, a gas pressure regulator, a pressure relief valve, an incandescent particle tray, two hooks for hanging the heater, this manual and a warranty registration card. **Do not lose this manual as there is a charge for replacement.** Please complete and return the enclosed warranty registration card. The FXHOOD horizontal vent terminator is supplied separately from the 425EF water heaters. There is a set of installation instructions in the FXHOOD box.

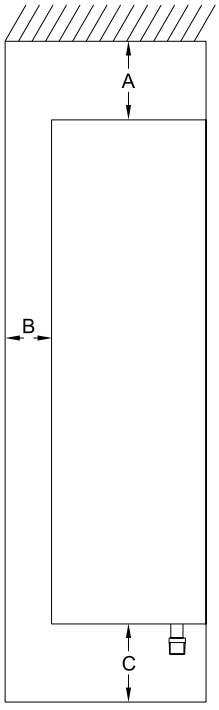


FRONT VIEW



SIDE VIEW

MINIMUM INSTALLATION CLEARANCES FROM COMBUSTIBLE AND NON COMBUSTIBLE MATERIALS FOR ALCOVE OR CLOSET INSTALLATIONS



	MODEL 425 EF
TOP (A)	12 "
FRONT (B)	4 "
BACK	0 " *
SIDES	4 "
FLOOR (C)	12 "
VENT DIAMETER	4 "

* On a combustible wall surface the unit should be mounted away from the wall to provide adequate clearance of the vent pipe.
See page 5 for instructions.

MODEL 425 EF

GENERAL RULES TO FOLLOW FOR SAFE OPERATION

1. You should follow these instructions when you install your heater. In the United States: The installation must conform with local codes or, in the absence of local codes, the National Fuel Gas Code ANSI Z223.1/NFPA 54.
In Canada: The Installation should conform with CGA B149.(1,2) INSTALLATION CODES and /or local installation codes.

2. Carefully plan where you install the heater. Correct combustion air supply and flue pipe installation are very important. If not installed correctly, fatal accidents can be caused by lack of air, carbon monoxide poisoning or fire.

3. The place where you install the heater must have enough ventilation. The National Fire Codes do not allow gas fired water heater installation in bathrooms, bedrooms or any occupied rooms normally kept closed. See the section below on locating the heater.

4. You must install your heater so that the venting complies with all requirements. See section on Venting the Heater, pages 6 and 7.

5. The appliance must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 Psig (3.5 kPa).

The appliance must be isolated from the gas supply piping during any pressure testing of the gas supply piping system at test pressures in excess of 1/2 Psig (3.5Kpa). The appliance and its gas connection must be leak tested before placing the appliance in operation.

6. Keep water heater area clear and free from combustibles and flammable liquids. Do not locate the heater over any material that might burn. Do not install heater over carpeting.

7. Correct gas pressure is critical for the optimum operation of this heater (see specifications on page 2 and chart on page 9). Gas piping must be sized to provide the required pressure at the maximum output of the heater. Check with your local gas supplier, and see the section on connecting the gas supply.

8. Should overheating occur or the gas supply fail to shut off, turn off the gas supply at the manual gas shut off valve on the gas line.

9. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.

10. When installed, the appliance must be electrically grounded in accordance with local codes or, in the absence of local codes, in accordance with the *National Electrical Code* ANSINFPA 70 and/or the *CSA 22.1 Electrical Code.*

PROPER LOCATION FOR INSTALLING YOUR HEATER

Carefully select the location of your new heater. For your safety and for proper heater operation, you must provide an abundant supply of combustion air and a proper venting installation.

The heater may still operate even when improperly vented. It will, however, be less efficient and could eventually damage the heater. It could even result in human sickness or death due to oxygen deprivation and carbon monoxide poisoning. Before installing the unit, be certain you have the correct heater for your type of Gas – Propane or Natural Gas. Identification labels are found on the shipping box, and on the rating plate which is located on the right side panel of the cover. Also, each burner orifice is stamped with a number (79 for LPG and 120 for Natural Gas).

Follow the guidelines below:

1. National building codes require that you **do not install this appliance in bathrooms, bedrooms, unvented closet or any occupied rooms normally kept closed.**

2. Simultaneous operation of other appliances such as exhaust fans, ventilation systems, clothes dryers, fireplaces or wood stoves could create a vacuum effect in your home which could cause dangerous combustion by-products to spill back into your home rather than venting to the outside through the flue. Confirm that your 425 EF is venting properly when all these other appliances are running. See page 6 to test venting performance.

Do not obstruct the flow of combustion air to the appliance. This appliance is power vented and uses room air. Note: Electrical power is required to operate the power exhaust. Proper air supply to the appliance is essential.
If installed near a clothes dryer it is very important that the dryer be properly vented. Failure to properly vent a dryer could result in a gradual accumulation of lint on the water heater fin coils and burners, leading to a dangerous condition of vent blockage and poor, unsafe combustion.

3. Your hot water lines should be kept short to save energy. It is always best to have hot water lines insulated.

⚠ **WARNING: DO NOT INSTALL IN AN AREA WHERE IT COULD FREEZE. This heater is neither designed for nor approved for outside installation**. Drain the heater entirely if freezing temperatures are anticipated in area where heater is installed by disconnecting both the inlet and outlet water connections from the heater (disconnect the outlet flex line from where it connects to the copper heat exchanger). Additionally, remove the drain plug under the water valve. See Fig 1.

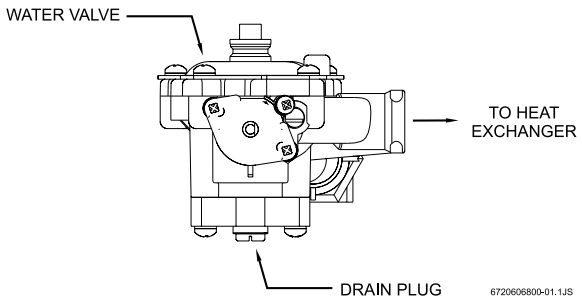


Fig. 1 - Water heater drain plug

⚠ **WARNING:** Flammable materials, gasoline, pressurized containers, or any other items or articles that are potentially fire hazards must NOT be placed on or adjacent to the heater. The appliance area must be kept free of all combustible materials, gasoline and other flammable vapors and liquids.

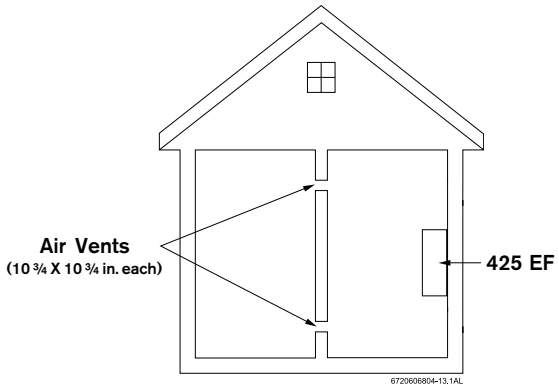
COMBUSTION AIR REQUIREMENTS

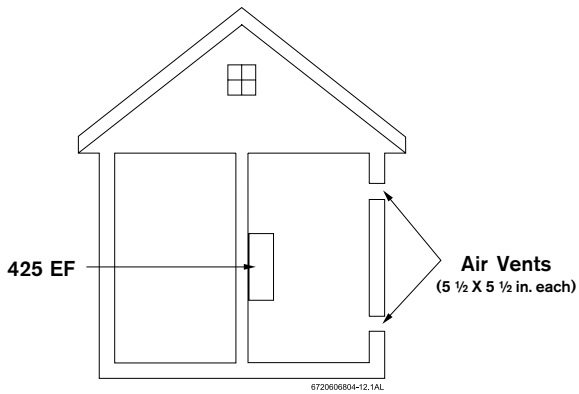
The 425 EF water heater holds cold water in its copper heat exchanger and brass water valve when not in use. Because of this, any cold air that comes in through the unit's vent pipe is capable of freezing these components. This Installation Manual specifies the vent length requirements and the amount of combustion air required for this unit. When all requirements are followed, the unit will operate properly and safely. However, there may still be a risk of freezing due to negative draft if all the combustion appliances in the area are not being supplied with a sufficient amount of make-up air. A wood stove or furnace may pull combustible air through the 425 EF vent pipe, leaving the cold infiltrating air capable of freezing the cold water in the 425 EF heat exchanger. To prevent this the **FXHOOD** horizontal vent terminator, which is supplied separately with the water heater, needs to be installed on the end of the horizontal vent run (see page 9). The **FXHOOD** is a CSA approved vent terminator for the 425 EF and has a built in back draft flapper.

Observe the following instructions concerning combustion air.

Appliances located in unconfined spaces:

a) An unconfined space is one whose volume is greater than 50 cubic feet per 1000 Btu per hour of the combined rating of all appliances installed in the space. That would be 6500 cubic feet for the 425 EF alone.
b) In unconfined spaces in buildings of conventional frame, masonry, or metal construction, infiltration is normally adequate to provide air for combustion, ventilation, and dilution of flue gasses.





Appliances located in confined spaces: The confined space must be provided with two permanent openings, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the enclosure. Each opening must have a minimum free area of one square inch per:

– 1000 Btu/hr if all air is taken from inside the building.
– 2000 Btu/hr if all air is taken from the outside by horizontal ducts.
– 4000 Btu/hr if all air is taken from the outside by direct openings or vertical ducts.

Or the confined space must be provided with one permanent opening or duct that is within 12 inches of the ceiling of the enclosure. This opening must have a minimum free area of one square inch per:

– 3000 Btu/hr if all air is taken from the outside by a direct opening or vertical duct.

Louvers, grills and screens have a blocking effect. If the effective free area is not known, assume it is 20 % to 25% of the total opening for wood louvers and 60 % to 75% for metal louvers. Refer to the National Fuel Gas Code for complete information. In buildings of tight construction all air should be taken from outside.

This product is not approved for manufactured homes (mobile home), recreational vehicles (RV) or boats. Reference ANSI Z21.10.3.
This product is neither designed or approved for outside installations.

CLEARANCES

The 425 EF is design certified for installation on a combustible wall and for installation in an alcove or closet with the minimum clearances to combustible and non - combustible construction listed below

A. Top 12 inches (305 mm)
B. Front 4 inches (102 mm)
C. Back 0 inches*
D. Sides 4 inch (102mm)
E. Bottom 12 inches (305 mm)

* On a combustible wall surface the unit should be mounted away from the wall to provide adequate clearance of the vent pipe. Clearance from the vent pipe is dependent upon the clearance rating of the venting material used. See VENTING section.

MOUNTING INSTALLATION

The 425 EF is design certified for mounting on a wall.
Secure the two L shaped hooks, which are provided with heater, to a wall surface. Place them 13 ¼" apart as shown in Fig 2.
Do not install this appliance on a carpeted wall or over floor covering which is combustible, such as carpet. The heater must be mounted on a wall using appropriate anchoring materials. If wall is a stud wall sheathed with plasterboard, it is recommended that support board(s) either 1x4's or 1/2" (minimum) plywood first be attached across a pair of studs and then the heater should be attached to the support boards. See Fig 2.
NOTE: Additionally the 425 EF should be spaced away from any combustible wall surface to provide the necessary clearance that the venting material specifies must be maintained between the vent pipe and a combustible surface. See VENTING section. Also, review the FXHOOD horizontal vent terminator instruction sheet (provided with the FXHOOD) prior to installation.
In earthquake-prone zones, CEC recommends that installers use a large washer and lag screw through the existing holes used to hang the heater to affix the upper third of the heater to the mounting board. To affix the lower third of the heater, CEC recommends that two new holes be drilled in the heater's frame, each one 16 inches below the top two holes, and that washers and lag screws be used to secure the lower portion of the heater to a spacing board.
Expansion and contraction of piping due to changing water temperature in the pipes imparts movement to the heater which, if mounted directly to a brittle, friable board, such as plasterboard, can cause failure of mounting.

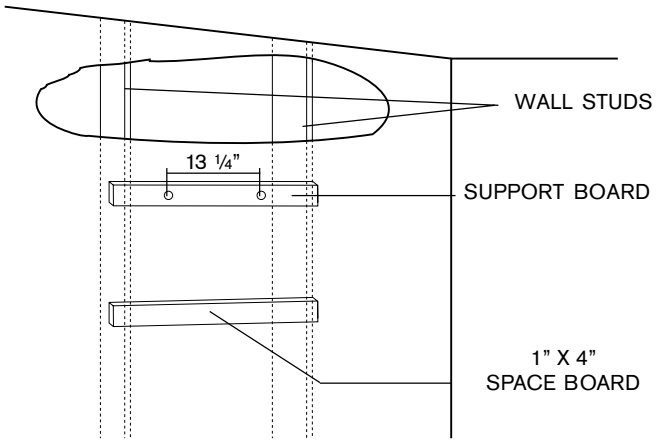


Fig. 2 - Mounting the Heater

The incandescent particle tray (shipped loose in the carton with the water heater) must be attached at the bottom of the water heater front cover at the time of installation. Use the screws provided. See figure 3.

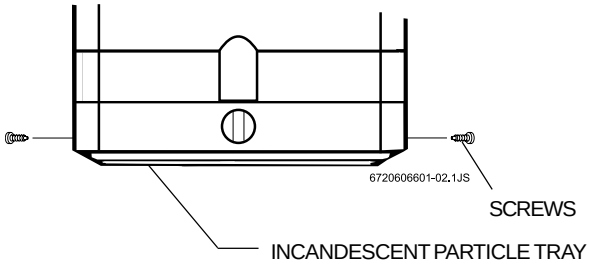


Fig. 3 - Incandescent Particle Tray Illustration

VENTING

⚠ **WARNING: Do not reduce the vent pipe size and do not common vent with any other vented appliance or stove.**

This appliance must be vented horizontally to the outside with a sealed 4" single wall vent pipe. The appliance's flue gasses are under positive pressure and must travel through a single wall 4" pipe that is sealed gas tight. The 4" single wall vent pipe can be either stainless steel (AL29-4C) or galvanized steel with at least 26 gauge. CEC recommends the use of stainless steel vent pipe (which is equipped with sealing gaskets) for ease of installation and durability. When using galvanized vent pipe a minimum of 4 sheet metal screws per connection must be installed and all seams must be sealed with an approved high temperature silicone sealant. The vent system must be gas tight. See Fig. 4 for suggested venting installation diagrams.

The 425EF shall not be vented in combination with any other appliance. This appliance may only be vented horizontally with a dedicated sealed single wall vent. The 425EF shall not be vented into masonry chimneys or existing vertical vents of any material.

CAUTION: 425EF vent system must be installed by a qualified agency in accordance with these instructions. If improperly installed a hazardous condition such as explosion or Carbon Monoxide poisoning could result. Controlled Energy Corporation will not be responsible for improperly installed appliances.

Establish vent clearances that comply with vent manufacturer's specifications. In all cases follow local codes. See table below.

The vent diameter must be 4". The appliance should be located as close to the point of termination as possible (see Fig. 5 for locating the terminator). The vent system should be as straight and short as possible. The vent pipe must be 4" single wall stainless steel (AL29-4C) or galvanized steel pipe of 26 minimum gauge. **Maximum vent length is 15 feet (4.6 m) with two 90-degree elbows.** Subtract 5 feet from the total vent length for each additional 90-degree elbow used. No more than four 90-degree elbows may be used. Any short vertical portion of vent pipe used in the vent system shall be considered part of the allowable 15 feet (4.6 m) maximum run. Support the vent run at 4 foot intervals with overhead hangers. Horizontal sections of vent must rise ¼" for every foot of horizontal length. Any vent section greater than 45 degrees is considered and elbow.

Note: Single wall pipe should not be used in concealed, unoccupied or unheated locations. Listed thimbles or collars are necessary to pass through wall partitions. If the vent system passes through combustible areas where the vent clearance requirements cannot be maintained, it is permissible to chase straight sections of sealed 4 inch single wall vent through 5 inch (or greater) Type-B vent. The distance to combustibles using this chase technique is 1 inch. **Note:** Type-B vent should never be used as the actual vent system for the 425EF, as it is not gas tight.

Freeze Warning:

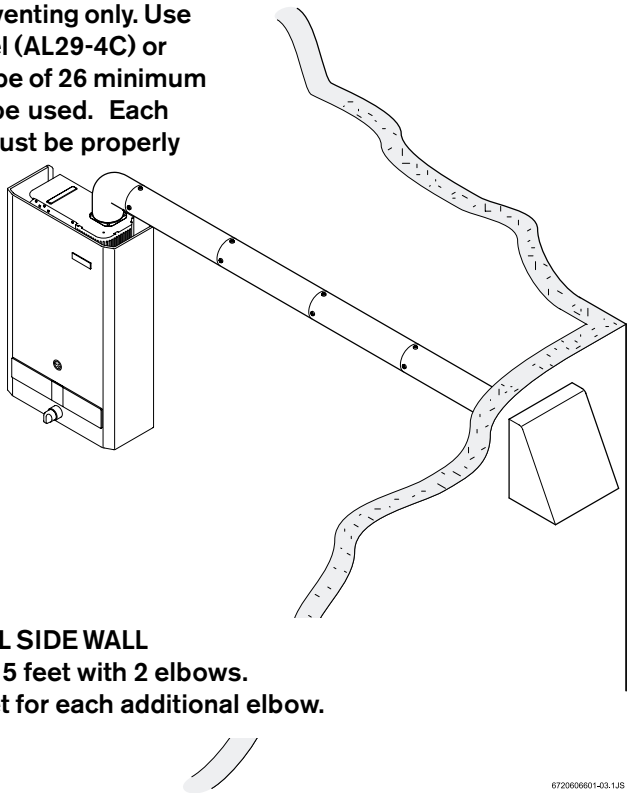
As mentioned on Page 6, negative air pressure in cold climates will cause a reverse airflow in the vent system that can freeze and damage the 425 EF heat exchanger when not in use. To prevent this the **FXHOOD** horizontal vent terminator, which was supplied separately with the water heater, needs to be installed on the end of the horizontal vent run (see page 9). The **FXHOOD** is a CSA approved vent terminator for the 425 EF and has a built in back draft flapper.

Flue Gas Sensor:

The 425 EF is equipped with a Flue Gas Sensor; it's mounted on the left side of the draft diverter (Flue Gas Sensor - #33 on page 21). Before leaving the installation site verify proper Flue Gas Sensor operation by temporarily blocking termination outlet. Once blocked then operate the heater, the unit should shut down within 1-3 minutes when the flue gases are blocked. You must reset the electrical power to the heater after this safety test has been conducted, otherwise the unit will not operate.

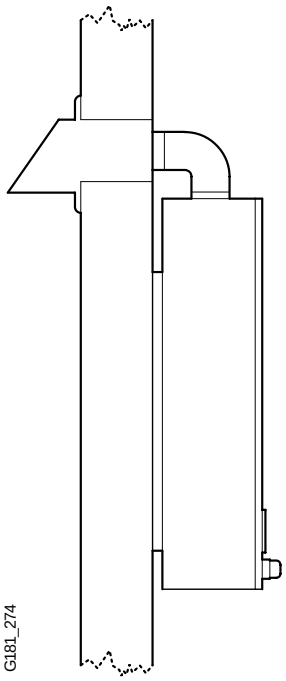
<table>
<tr><th colspan="6">The flue gas exhaust temperature on the 425 EF is 356°F (180°C)</th></tr>
<tr><th>Venting Material Options</th><th>Exhaust vent diameter</th><th>Exhaust vent maximum distance</th><th rowspan="3">Clearances from venting material</th><th>Vent pipe within an unenclosed space</th><th>Vent pipe within an enclosed space</th></tr>
<tr><td>Single wall stainless steel (AL29-4C) sealed vent pipe</td><td>4 inch</td><td>15 feet (4.6 m) with two elbows. Less 5 feet for each additional elbow.</td><td>*See manufacturer's specifications</td><td>*See manufacturer's specifications</td></tr>
<tr><td>Single wall galvanized vent pipe (min. 26 gauge and sealed with high temperature silicone)</td><td>4 inch</td><td>15 feet (4.6 m) with two elbows. Less 5 feet for each additional elbow.</td><td>6 inches</td><td>NOT PERMISSIBLE</td></tr>
<tr><td colspan="6">*Stainless steel (AL29-4C) vent pipe manufacturer's are Z-Flex, Protech and Heat Fab. The manufacturer's specified clearances are identified on the venting material. NOTE: clearance distances are variable depending if the vent pipe is installed in an enclosed or unenclosed space, the exhaust flue gas temperature and the orientation of the vent pipe.</td></tr>
</table>

4”single wall venting only. Use stainless steel (AL29-4C) or galvanized pipe of 26 minimum gauge must be used. Each connection must be properly sealed.



Approved Vent Terminal
(FXHOOD or other approved terminal)
The FXHOOD is design approved with the 425 EF and has a built in back draft flapper to prevent negative air from freezing the 425 EF – see Fig. 5 for restrictions in location of vent terminal.

HORIZONTAL SIDE WALL
*** Maximum 15 feet with 2 elbows.**
Deduct 5 feet for each additional elbow.



Approved Vent Terminal
(FXHOOD or other approved terminal)
The FXHOOD is design approved with the 425 EF and has a built in back draft flapper to prevent negative air from freezing the 425 EF – see Fig. 5 for restrictions in location of vent terminal.

4”single wall venting only. Use stainless steel (AL29-4C) or galvanized pipe of 26 minimum gauge must be used. Each connection must be properly sealed.

Fig 4: Some Venting Guide Suggestions

An approved side wall vent terminal must be used when the water heater is vented through a side wall. Locate in accordance with ANSI Z223.1 and local applicable codes. See Fig 5 for restrictions in location of vent terminal in relation to opening doors and windows, grade, and forced air inlets. Be certain that snow and ice will not interfere with the vent.

The approved vent terminal must be installed so that flue gases will not jeopardize people, overheat combustible structures or enter into buildings, and so that proper clearances are maintained (See Fig 5).

a) The vent terminal shall not be less than 7 feet above a public walkway.
b) The vent terminal shall terminate at least 3 feet above any (mechanical) air inlet within 10 feet.
c) The vent terminal shall not be within a 6-foot radius from a gas meter or regulator.
d) The vent terminal shall be a minimum of 6 feet from any combustion air inlet.
e) The vent terminal shall terminate from an opening window, at least 4 feet below or 4 feet horizontally from the opening.
f) The vent terminal shall terminate from a door, at least 1 foot above and 4 feet horizontally from the door.
g) The vent terminal shall not be less than 3 feet from an adjacent building.
h) The vent terminal shall not be less than 1 foot above grade.

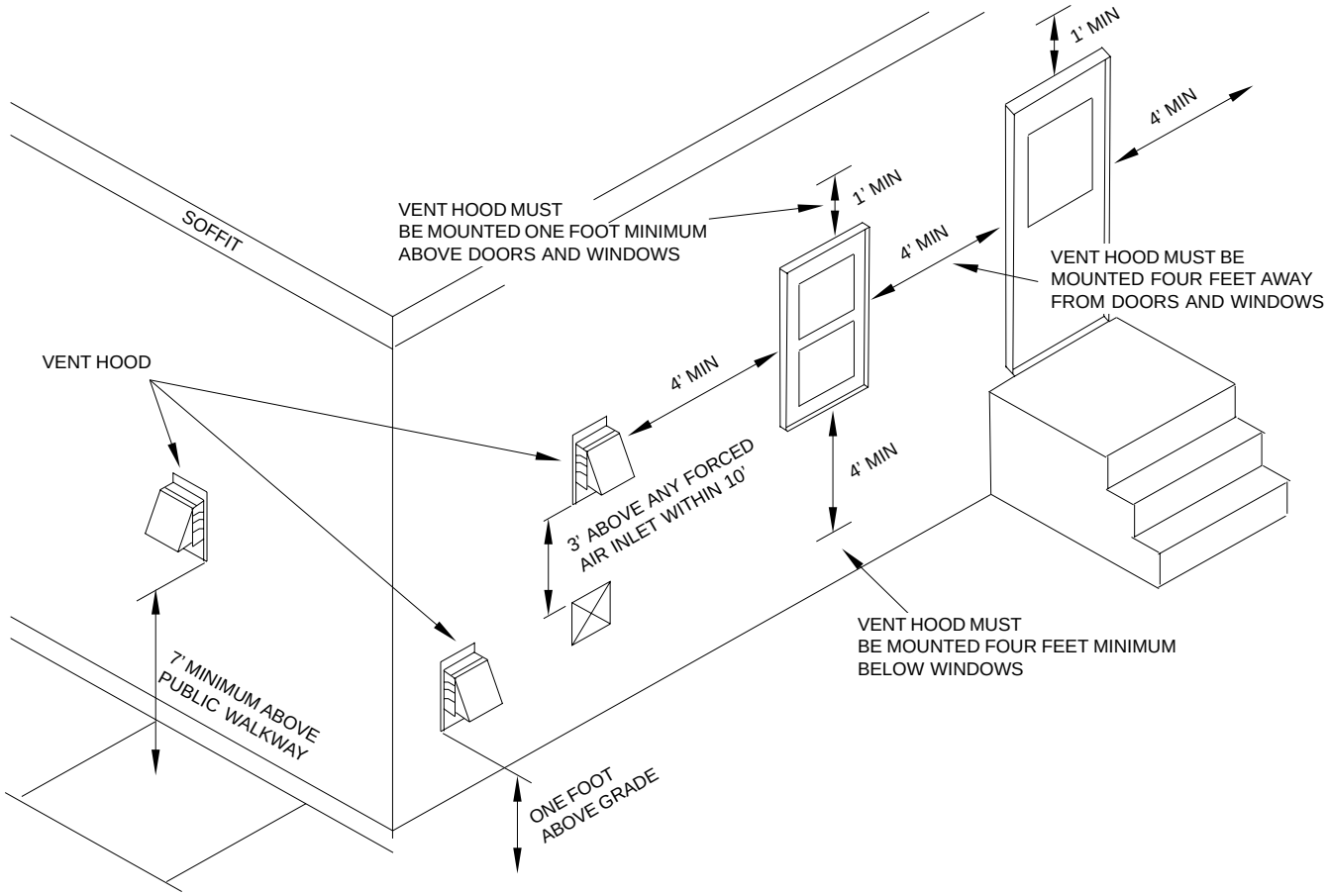


Fig 5: Side wall exit locations for mechanical draft vent terminals

GAS CONNECTIONS

NOTE: The 425 EF is supplied with a gas pressure regulator that must be installed on the heater before attaching the gas supply line. See figure 6. Failure to install the gas regulator as shown in figure 6 will be a violation of CSA certification of the unit. The regulator supplied with the heater is preset for the gas shown on the rating plate to the correct pressure. It is an appliance level regulator designed for (low inlet) pressure (less than 1/2 Psig or 15" W.C.) DO NOT connect to an unregulated or high pressure propane line or to a high pressure commercial natural gas line.

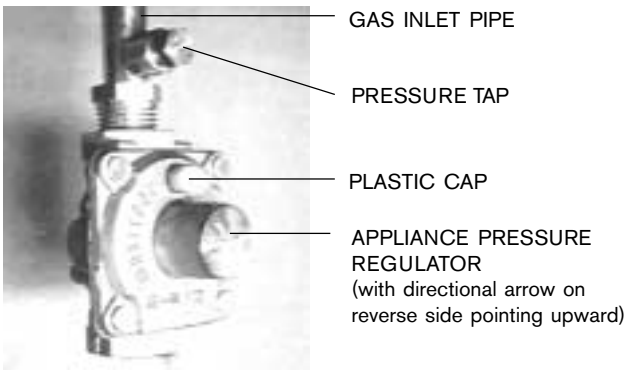


Fig. 6 - Appliance pressure regulator (with directional arrow on reverse side pointing up)

GAS LINE SIZING

The pressure regulator provided with the heater is adjusted to deliver the proper gas pressure (as indicated on the rating plate and in the manual for altitude up to 2000 feet (660 meters) above sea level. On appliances being installed above 2000 ft (660 meters) elevation, the inlet gas pressure should be set at installation to the value shown below.

NOTE: The gas pressures specified below refer to pressures taken at the pressure tap on the gas inlet pipe just above the regulator (See Fig 6). These readings should be taken while the heater is operating at full input – i.e. maximum water flow with the temperature dial selector turned all the way clockwise.

MAXIMUM INLET GAS FLOW PRESSURE SETTINGS

Altitude	Natural Gas inches W.C:	Liquid Propane inches W.C:
0' - 2.000 ft	5.7"	10.5"
2.000 ft - 4.500 ft	4.6"	8.4"

Above 4.500 ft consult your local gas provider.

GAS LINE SIZING

-It is strongly recommended that the Natural Gas pipe be Black Iron pipe the entire distance from the outside meter to the inlet of the 425 EF regulator. 1/2" Black Iron pipe up to 10 feet, 3/4" Black Iron pipe up to 40 feet and 1" Black Iron pipe up to 125 feet distances. Flex line tubing is NOT recommended, but if used then oversize it.
-It is strongly recommended that the LP Gas pipe be semi-rigid copper or Black Iron pipe from the outside regulator to the inlet of the 425 EF regulator. For semi-rigid copper piping: 5/8" up to 20 feet and 3/4" up to 50 feet distances. For Black Iron piping: 1/2 " up to 30 feet and 3/4" up to 150 feet distances. Flex line tubing is NOT recommended, but if used then oversize it.
THESE FIGURES ARE FOR 425 EF SUPPLY ONLY, ALL OTHER APPLIANCES IN THE BUILDING WILL NEED TO BE INCLUDED IN THE PIPE SIZING.

National Fuel Gas Code requires that a sediment trap (drip leg) be installed on gas appliances not so equipped. The drip leg must be accessible and not subject to freezing conditions. Install in accordance with the recommendations of the serving gas supplier.

⚠ **WARNING:** The heater must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of .5 psig.
The water heater must be isolated from the gas supply piping system by closing the manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or greater than .5 psig.
The water heater, including the pressure regulator provided with it, must not be operated at gas supply pressures in excess of .5 psig. If overpressure has occurred, such as through improper testing of the gas lines or malfunction of the supply system, the gas valve and regulator must be checked for safe operation.
When your connections are made, check for gas leaks at all joints (not just the ones you made). Apply some soapy water to all gas fittings and gas valve. **Soap bubbles are a sign of a leak.**
NOTE: Do not apply soap solution to pilot filter screen or pilot orifice area. If you have a leak, shut off the gas. After verifying that required gaskets are in place, tighten appropriate fittings to stop leak. Turn the gas on and check again with a soapy solution. **Never test for gas leaks using a match or flame**.

GAS PIPING, CONNECTIONS

Before connecting the gas supply, check the rating plate on the right side of the front cover to be sure that the heater is rated for the same gas to which it will be connected.
In the United States: The installation must conform with local codes or, in the absence of local codes, the National Fuel Gas Code ANSI Z223.1/NFPA 54.
In Canada: The Installation should conform with CGA B149 INSTALLATION CODES and /or local installation codes.

GAS LINE SIZING

FOR NATURAL GAS

Maximum Capacity of pipe in Cubic Feet of Gas per Hour for Gas Pressure of 0.5 Psig or less and a Pressure drop of 0.3 in Water Column.

(Based on a 0.60 Specific Gravity Gas) Btu numbers given in thousands.

Follow boxed numbers for piping just one 425 EF (example: 3/4" B.I. Natural Gas pipe for 30 ft. will handle 152,000 btu's). For multiple appliances combine the total btu input load and then refer to applicable chart below.

Nominal Iron Pipe Size, inches	Internal Diameter inches	Length of Black Iron Pipe, Feet													
		10	20	30	40	50	60	70	80	90	100	125	150	175	200
1/4	0.364	32	22	18	15	14	12	11	11	10	9	8	8	7	6
3/8	0.493	72	49	40	34	30	27	25	23	22	21	18	17	15	14
1/2	0.622	132	92	73	63	56	50	46	43	40	38	34	31	28	26
3/4	0.824	278	190	152	130	115	105	96	90	84	79	72	64	59	55
1	1.049	520	350	285	245	215	195	180	170	160	150	130	120	110	100
1 1/4	1.380	1050	730	590	500	440	400	370	350	320	305	275	250	225	210
1 1/2	1.610	1600	1100	890	760	670	610	560	530	490	460	410	380	350	320
2	2.067	3050	2100	1650	1450	1270	1150	1050	990	930	870	780	710	650	610
2 1/2	2.469	4800	3300	2700	2300	2000	1850	1700	1600	1500	1400	1250	1130	1050	980
3	3.068	8500	5900	4700	4100	3600	3250	3000	2800	2600	2500	2200	2000	1850	1700
4	4.026	17,500	12,000	9,700	8,300	7,400	6,80	6,200	5,800	5,400	5,100	4,500	4,100	3,800	3500

FOR LP GAS

Maximum Capacity of Pipe in Thousands of BTU per Hour of Undiluted Petroleum Gases (at 11 inches Water Column Inlet Pressure) (Based on a Pressure Drop of 0.5 Inch Water Column).

Nominal Iron Pipe Size, Inches	Black Iron Pipe Length of Pipe, Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	567	693	315	267	237	217	196	185	173	162	146	132
1	107	732	590	504	448	409	378	346	322	307	275	252
1 1/4	220	149	121	103	913	834	771	724	677	630	567	511
1 1/2	330	229	185	155	141	127	118	108	102	976	866	787
2	622	433	346	299	264	239	220	204	192	1811	1606	1496

Maximum Capacity of Semi-Rigid Tubing in Thousands of BTU per Hour of Undiluted Liquified Petroleum Gases (at 11 inches Water Column Inlet Pressure)

(Based on a Pressure Drop of 0.5 Inch Water Column)

Outside Diameter, Inch	Copper Length of Tubing, Feet									
	10	20	30	40	50	60	70	80	90	100
3/8	39	26	21	19	_	_	_	_	_	_
1/2	92	62	50	41	37	35	31	29	27	26
5/8	199	131	107	90	79	72	67	62	59	55
3/4	329	216	181	145	131	121	112	104	95	90
7/8	501	346	277	233	198	187	164	155	146	138

* Source National Fuel Gas Code NFPA 54, ANSI Z223.1 - No Additional Allowance is necessary for an ordinary number of fittings

WATER CONNECTIONS

Install the heater centrally in the building if possible and make hot water piping runs as short as possible When facing the heater, the cold water inlet will be on the right and the hot water outlet on the left..

Although water piping throughout the building may be other than copper, copper or galvanized piping should be used when connecting to the heaters ½" male NPT flex connectors (follow local codes if more stringent). Plastics or other PEX type plumbing line materials are not suitable for connecting directly to the water heater. Keep water inlet pipe to no less than ½" (19.05mm) diameter to allow the full flow capacity. If the cold and hot connections to the heater are reversed, the heater will not function.

The 425 EF is provided with one flexible type connector that must be connected to the cold inlet fitting of the water valve as shown in Fig. 7. The union end of the flexible connector should be attached to the rear inlet port of the water valve with the supplied washer gasket. No pipe dope or thread tape is to be used at this joint. The ½" flexible hot water outlet line is supplied attached to the heater.

Be certain there are no loose particles or dirt in the piping. Blow out or flush the lines before connecting to the water heater. Full port valves should be installed on both the cold water supply and hot water outlet lines to facilitate servicing the heater (see Fig. 7). For installation on a private well system with the use of a pressure tank, the lowest pressure range setting recommended is 30-50 psi (2.07-3.45 bar).

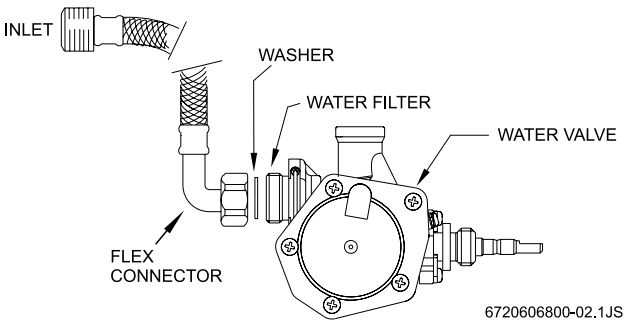


Fig.7 - Water valve and water connectors, top view

Connecting the pressure relief valve (PRV)

The listed pressure relief valve supplied with the heater must be installed at the time of installation. Should a discharge line be added to the PRV no valve is to be placed between the PRV and the heater. No reducing coupling or other restriction may be installed in the discharge line. The discharge line must be installed such that it allows complete drainage of both the PRV and the line. The location of the PRV must be readily accessible for servicing or replacement and be mounted as close to the water heater as possible. To install the PRV, a suitable fitting connected to an extension on a "T" fitting can be sweated to the hot water line. See Fig 8.

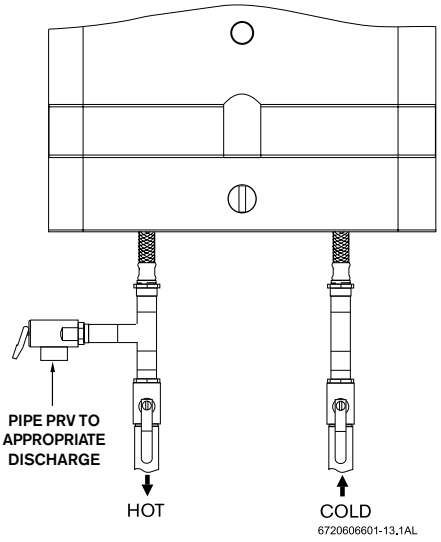


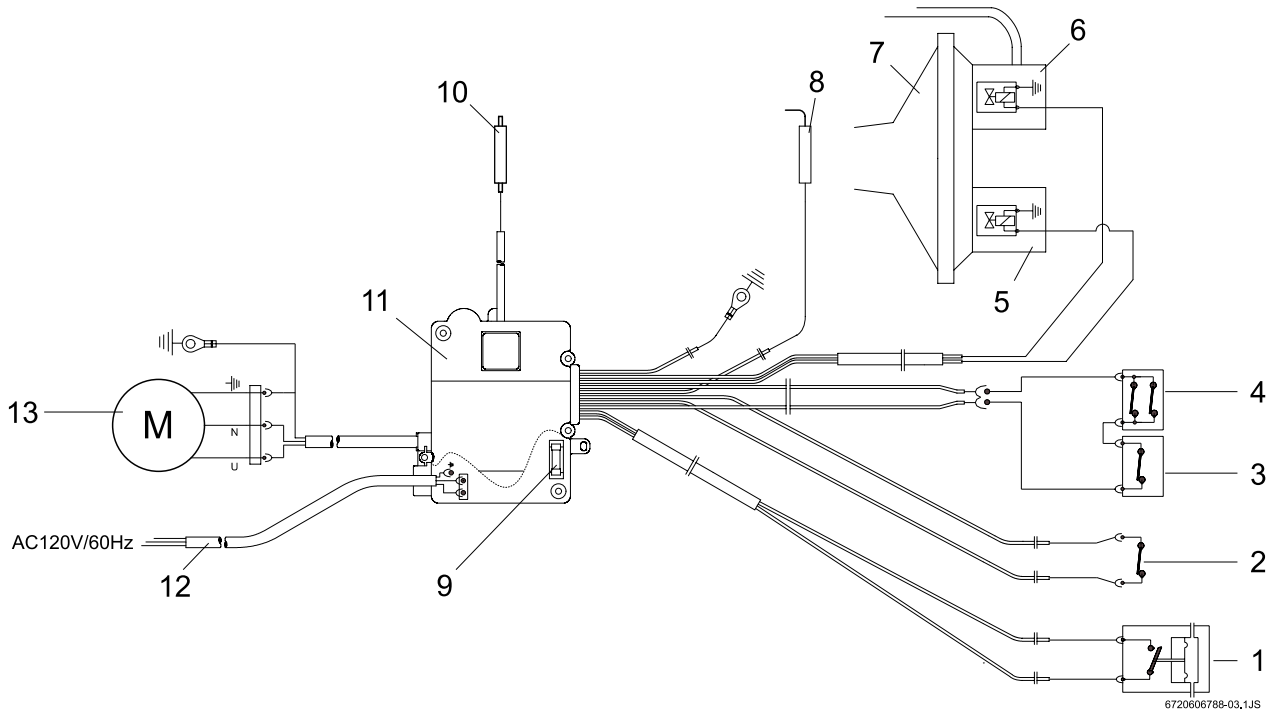
Fig. 8 - Plumbing and Pressure Relief Valve

ELECTRICAL CONNECTIONS

⚠ **WARNING:** For safety reasons, disconnect the power supply to the heater before any service or testing is performed.

⚠ **WARNING:** This heater must be electrically grounded in accordance with the most recent edition of the National Electrical Code, NFPA 70. In Canada, all electrical wiring to the heater should be in accordance with local codes and the Canadian Electrical Code, CSA C22.1 Part 1. Do not rely on the gas or water piping to ground the metal parts of the heater.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring error can cause improper and dangerous operation. Verify proper operation after servicing.
The 425 EF requires an electrical power supply from 120VAC 60Hz circuit and must be properly grounded.
- A means for switching off the 120 VAC power supply must be provided.
- The heater is wired as shown in the wiring diagram. (Fig 9).



1 - microswitch
2 - On / Off switch
3 - temperature limiter
4 - flue gas safety device
5 - burner electrovalve
6 - pilot electrovalve
7 - Diaphragm switch
8 - ionization probe (flame sensor)
9 - fuse
10 - pilot electrode
11 - electric control box
12 -power cord
13 - exhaust fan

Fig 9: Wiring Diagram for 425 EF

OPERATING INSTRUCTIONS

Before operating the heater, make sure that the system is filled with water.

Open the cold water inlet supply to the heater fully.
Open a hot water faucet to permit the water to fill the heater and the piping and to eliminate the air trapped in the system Close the hot water faucet after the water flows freely and all the air has escaped from the system. The water heater is now ready to operate.

FOR YOUR SAFETY READ BEFORE OPERATING YOUR HOT WATER HEATER

⚠ **Warning: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.**

A. This appliance is equipped with electronic ignition for lighting the pilot and main burners. When turning the heater on, follow these instructions exactly.
B. Before operating the unit, set the On/Off switch to the On (●) position. The On/Off switch is located behind the flip-down coverplate on the front panel strip. Smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in the on/off control button. Never use tools. Follow these instructions exactly. If control button is jammed, close the gas supply and call a qualified service technician. Attempted forceful repair may result in a fire or explosion.
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING AND OPERATING INSTRUCTIONS

1. STOP! Read the safety information on the front panel of the heater.
2. The gas valve must be turned off by putting the On/Off switch to position " O " (see fig. 10). Wait five (5) minutes to clear out any gas. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to next step.
3. This water heater is equipped with a safety pilot burner and an automatic ignition control system.
4. Set the ON/OFF switch (flip down cover plate on front panel strip) marked O / ● to the "● " position. In this position the water heater is ready to use.
5. Verify that the power supply to the appliance is turned on.
6. Turn the hot water faucet on to the minimum flow required to activate the heater. The automatic ignition system first ignites the safety pilot burner which then ignites the main burner in about 4 seconds. The power exhaust will then activate.
7. The pilot flame will extinguish 10-30 seconds after the burners come on. The burners will remain on until the hot water tap is turned off.

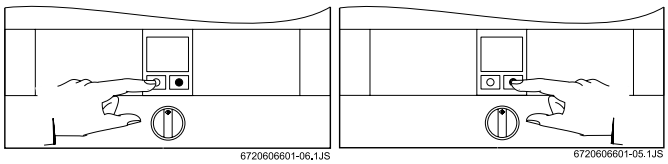
NOTE: On a first time installation, existence of air in the gas supply line and in the water line may cause some ignition delay. In that case, repeatedly open and close the hot water tap in order to restart the ignition process until all the air has been purged.

TO TURN OFF GAS TO APPLIANCE

Turn off the manual lever on the gas supply line to the heater and set the ON/OFF switch to the OFF (O) position, see Fig. 10.

SETTING THE WATER TEMPERATURE

To operate the heater, set the ON/OFF switch to position " ● ". The switch is located behind the flip down cover plate on the front panel strip.
To shut down the gas to the heater, set the ON/OFF switch to position " O "



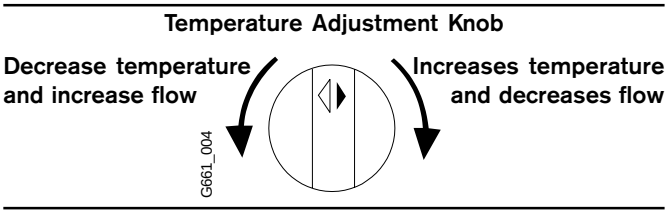


Fig. 10 - Principles of Operation

The 425 EF LP and 425 EF NG water heaters have a gas control that modulates burner input in response to flow. Its purpose is to ensure that the hot water temperature will remain steady, although the demand for water flow might vary (down to 1/2 gal/minute). To adjust the temperature on your 425 EF, turn on a hot water faucet to its maximum flow. At the 425 EF, turn the large knob located beneath the main gas controls on the front of the heater all the way to the right (clockwise). See Fig 11. This will produce a temperature rise of approximately 90°F at flow rates between .5 and 2.0 gallons per minute. Given that average incoming water temperatures are 50°F, this heater will produce approximately 140°F water at these flow rates. Turning the dial all the way to the left (counterclockwise) will produce a temperature rise of approximately 45°F for flow rates between 1.0 and 4.0 gallons per minute. This will result in a higher flow rate, but at cooler temperatures. Turning the dial to locations in between will give various temperatures between

140° and 95°F at various flow rates between 2.0 and 4.0 gallons per minute. The position you select on the temperature selector dial will depend on the temperature of the incoming water (50°F is average in the U.S.). In warm weather regions where the incoming cold water is generally warmer, or during the hot weather months in some other areas a midway setting on the temperature selector knob will produce a temperature rise of about 70°F, giving an output of approximately 120°F. At this setting, if it is still necessary, one could mix a small amount of cold water in a shower and have a comfortable shower at about 3 gallons/ minute. During the colder months, or in cold climate areas, it might be necessary to set the control all the way clockwise to the right for maximum temperature rise.

Do not supply the 425 EF with preheated water. For this type of application, purchase a solar model 125 B LPS or 125 B NGS.

If the inlet water temperature to the water heater is very warm the heater can produce temperatures that may be found to be too hot. A temperature balance shower valve can automatically mix in cold water to reduce such hot water temperature, in the event of any temperature instability with the use of a temperature balance shower valve, refer to shower valve manufactures instructions for internal adjustment setting. Adjustments should be made to the hottest setting in the shower valve. Additionally the temperature control of the heater can be adjusted to produce a more comfortable hot water temperature.

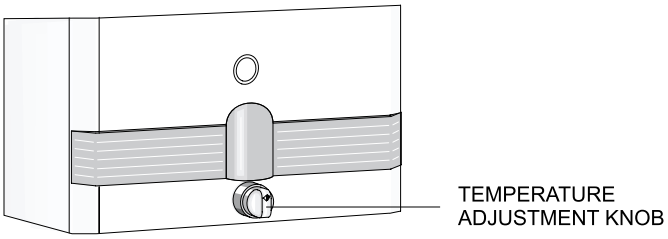


Fig. 11 - Temperature Adjustment Knob

MAINTENANCE AND SERVICE

⚠ REVIEW MAINTENANCE TABLE ON THE BACK OF THIS MANUAL

Approximately once a year, the 425 EF should be checked and cleaned. To remove the front cover, first remove the incandescent particle tray, then pull off the temperature adjustment knob and unscrew and remove the plastic collar. Unscrew the central screw located at the bottom of the front cover. Pull main cover out toward you and lift up and out. THE FOLLOWING OPERATIONS SHOULD BE PERFORMED BY A QUALIFIED SERVICE PERSON:

Vent System: Should be checked annually. Clean and repair as needed.

Water Valve (Part # 8707002802): The water valve on this heater should be serviced periodically. Lubricate component #36 on page 21 with a small amount of silicon, faucet or lithium grease every two years to keep its o rings fresh and pushrod sliding smoothly. Every 3-5 years replace component #36 on page 21. The frequency will depend on the mineral content of the water and conditions of use or whenever signs of corrosion appear at the gas and water valve joint. Periodically check that the water inlet filter (#27 on page 21) is clean as well.

NOTE: If water valve is removed, be sure to also inspect the o ring seal on the end of the right hand side water pipe before re-installing. Lubricating the o ring with lithium or faucet and valve grease is recommended.

Pilot Flame: The pilot flame should burn with a clean, sharp, blue flame and should resemble the diagram in Fig. 12. If the flame is soft and yellow, the pilot burner orifice may need to be cleaned or serviced. The pilot flame should be approximately 2 inches long, extending past the flame sensor. If the flame is too small, it will not reach the flame sensor and the burners will not come on.

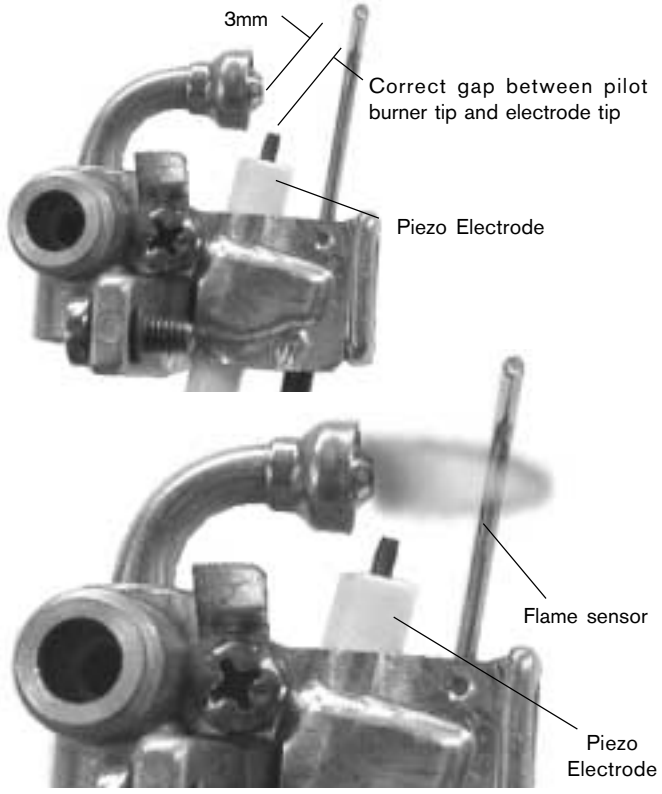


Fig. 12 - Characteristic Pilot Flame

To clean the pilot burner and/or the pilot orifice: Turn off the gas at the unit (Position ' O '). Remove the cover of the heater. To do so, pull off the temperature knob and unscrew and remove the temperature knob collar. Pull main cover out toward you and lift up and out. The pilot orifices should also be cleaned or replaced. **Do not enlarge the orifice (see fig. 13).** Do not use any wire or sharp object to clean orifices. Natural gas orifices are large enough that you can usually clean them by blowing through them. LP orifices, on the other hand, are too small to clean and should be replaced. See #3 in Trouble Shooting Section. To access the pilot orifice, remove 2 screws holding pilot assembly in place. Then loosen the compression fitting and lift up pilot burner to expose pilot orifice.

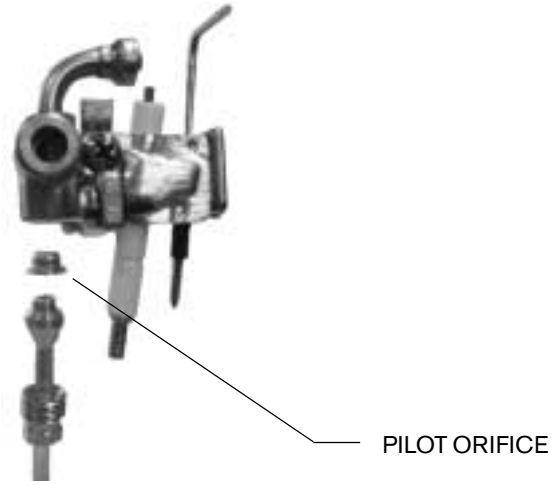


Fig. 13 - Pilot burner with pilot orifice

Main Burner Flames: The main burner flames should be blue, with a more intense blue cone in the center core. Yellow flames could be a sign of wrong size gas orifices or dirty burners, or a blockage on the heat exchangers fins. If some burners have yellow flames while others have good flames, it is likely that dust, lint or spider webs have partially clogged the burner venturis. To clean the burners, contact a gas service person.

Mineral Scale Build-up: 425 EF, when operated at lower temperature settings, do not accumulate mineral buildup. If however, the heater is used at the higher temperature settings and the water has a high mineral content, periodic descaling may be necessary. The heating coils should be flushed with a descaling solution.
Consult your dealer or service person.

TROUBLE SHOOTING (see maintenance table)

Introduction
The 425 EF pilot and burners are ignited by a water flow valve. Numerous water related problems can cause this water valve to malfunction such as: Insufficient water flow volume to activate the burners at its minimum flow requirement; Dirt in the water flow valve causing it to malfunction; Sediment build-up in faucet aerators, or shower heads; Uneven pressures between cold and hot with single lever faucets; Plumbing cross overs. These water flow related problems can cause the heater to deliver less than its full output, or to fail to ignite or to shut down completely.

Problems are stated in upper case, bold face. Most common causes for the problems follow in order of likelihood. The suggested solutions require that the cover be taken off. To do this, pull off the temperature knob and unscrew and remove the temperature knob collar. Pull main cover out toward you and lift up and out.

NO SPARK AT THE PILOT

1. On/Off switch is not "On" (Position " ● ").
The On/Off switch is located behind the flipdown cover plate on the front panel strip. See fig. 10.

2. Bad electrical connections.
Be certain that all electrical connections are clean, tight, and free of any moisture.

3. Water flow is not sufficient to activate heater.
Water flow rate at faucet is below minimum flow needed to activate heater. When temperature adjustment knob is turned all the way clockwise, the model 425 EF requires 1/2 gallon per minute flow to activate the heater. As a reference, this is a flow which would fill a quart jar in 30 seconds. If the temperature adjustment knob is turned fully counterclockwise, a flow rate of 1.1 gallons/minute is required to activate the heater.

4. Bad fuse
Check the viability of the fuse (see Fig 9 (#9) for location of fuse). Replace if necessary.

5. Water inlet filter is clogged
Water flow is restricted, preventing flow needed to activate heater. Clean water inlet filter screen.

6. Cross over in water lines
To confirm there is no cross-over in the plumbing, shut off the cold water supply to the 425 EF water heater and open a hot water faucet. There should not be any water flowing at that faucet. Water running is a sign of a plumbing cross-over. Consult your plumber.

7. Microswitch needs to be adjusted or replaced.
If you do not hear a click when a tap is opened, the microswitch needs to be adjusted. See Fig. 15 (#11) for location and see Fig. 14 for adjustment. The microswitch may need to be replaced.

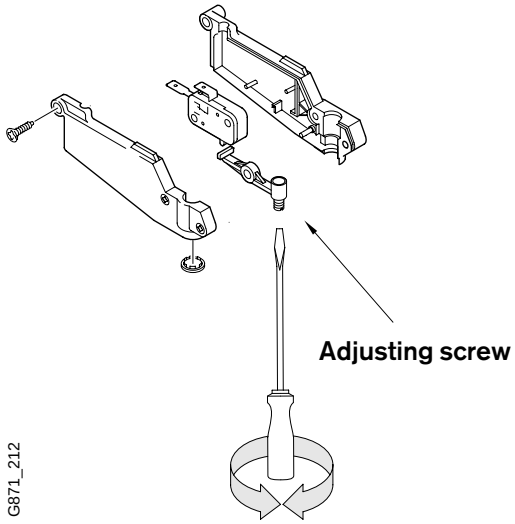


Fig. 14 - microswitch adjustment

Pilot does not spark with water flow	Pilot always sparks without water flow
1 Close water tap	1 Close water tap
2 Remove screw cap and unscrew till sparking starts	2 Screw in adjusting screw until it stops sparking
3 Screw in turning one and a half turns	3 Continue to screw in turning one and a half turns more

8. Cold incoming water connection made to wrong side of heater
Make sure cold water inlet connection is on the right side when you are facing the 425 EF.

9. Water valve parts may be dirty or components damaged
First check that venturi is free of dirt particles. Water valve and component parts must be totally free of dirt.

Mineral deposits can eventually (3-5 years in hard water areas) corrode the water valve parts to a point where they will need replacing. **Any sign of moisture at the bleed hole is a sign that the water valve needs to be replaced immediately.**

10. Poor circuit connections at the ECO (overheat sensor) or the flue gas safety device
Ignition sparker will not operate if the electrical circuit is interrupted. Check that the connections to the ECO are secure and tighten if necessary.

11. Reset electrical power to heater
If resetting the electrical power corrected the symptom then likely the unit's Safety Spill switch (Flue gas safety device - #33 on page 21) had tripped from a flue blockage during the previous usage. Inadequate combustion air to the room area can also cause the unit to improperly vent. Improper venting or insufficient combustion air must be corrected. Consult a licensed professional to inspect the installation.

SPARKS APPEAR AT PILOT WHEN HOT WATER TAP IS TURNED ON, BUT PILOT AND BURNERS WILL NOT IGNITE

1. Air in the Gas Line
Note: Normally this is a problem only at the time of initial installation, after the pipes have been worked on, or after a propane tank has been allowed to empty, or after the heater has been shut down for a long time.
Bleed all the air trapped in the gas line by turning the hot water faucet on and off until the air has been cleared from the line.

2. No gas to the 425 EF
A. Gas cock on gas line may not be open
B. Gas regulator may be shut or damaged. Replace or unlock the regulator. **Note:** The regulator furnished with the heater is exclusively designed for low gas pressure (less than ½ psig). Excessive pressure will lock it up. Locking usually happens when the gas pressure between the gas tank and the water heater's gas regulator has not been properly regulated. See Page 3 for recommended correct gas pressure. To unlock a regulator, consult your gas supplier or a gas technician.

3. Pilot orifice clogged or gas valve is dirty
Clogging of the pilot burner can be caused by dust in the air or dirt in the gas. The pilot orifice or gas filter may need to be cleaned or replaced. See Fig. 13.

4. Water valve assembly needs to be checked
If the pilot orifice is clean, the water valve assembly should be checked. The adjustment screw on the water valve micro-switch may not be tight enough (fig. 14). Remove central cap beneath micro-switch assembly, carefully loosen the adjustment screw until the pilot light ignites. At that point retighten the screw one and a half turns. See Fig 14.

5. Pilot electrovalve switch may need to be replaced (see fig 9).
Measure millivoltage at pilot electrovalve (see Fig 9).

6. Control Box may need to be replaced (see fig 9).
Check wire connections and test operation of control box (see Fig 9).

PILOT SPARKS CONTINUOUSLY WITH NO WATER RUNNING

1. Microswitch needs adjustment
If no water is running, but pilot electrode continuously sparks, the microswitch screw to the water valve needs adjustment. See Figure 14.

PILOT LIGHTS BUT BURNERS WILL NOT COME ON

1. Confirm the flame sensor is in its proper position. see Figure 12.

2. Poor circuit connections at the flue gas safety device
The burners will not come on if the powered fan exhaust is not working. Check that the unit is plugged in and that the sensors for the flue gases are secure.

3. Confirm the ECO connections are secure.

4. The Control Box may need to be replaced (see Fig. 9).
Check wire connections and test operation of control box (see Fig 9).

5. Burner electrovalve switch may need to be replaced (see Fig. 9).

MAIN BURNERS GO OUT DURING HOT WATER USE

1. Deficient exhaustion of flue gases
Check that vent is correct and clear of any obstructions, that sensors for flue gases are secure and that electrical connection has been made. If the heater will not come back on, **it will be necessary to turn the electrical supply to the heater off and then on again.**

2. Flow rate diminished below activation rate
Be certain that water flow is not less than required amount to activate heater.

3. Unbalanced pressure in waterlines
The added restriction caused by the 425 EF in the hot water system can result in uneven pressures between the cold and the hot. In such cases when mixing cold water at the tap, the lower hot water pressure may be overpowered by a much higher cold water pressure, which may cause the 425 EF burners to shut down (deactivate). Make sure faucet aerators or shower heads are free of minerals. ***Do not add any flow restrictor to the shower head.***
Typically this deactivation symptom is a result of the hot water being too hot to use comfortably. Warm inlet water generally causes this. Lowering the control knob setting and/or reducing the inlet gas supply to the heater should correct this deactivation symptom.

4. ECO (overheat sensor) tripped due to overheating
Do not feed preheated water to this water heater.

5. Minimum inlet pressure on well pressure tank is inadequate
Check the inlet water pressure. For installation on a private well system with the use of a pressure tank, the lowest pressure range setting recommended is 30-50 psi (2.07-3.45 bar).

WATER IS TOO HOT

1. Temperature Selection too high
Turn the temperature adjustment knob counter-clockwise (to the left) to lower the maximum water temperature.
Note: This will increase the activation flow rate.

2. Inlet water temperature is very warm (60°-75°F)
Reduce inlet gas supply to lower the heaters degree rise.
Note: Only the Model 125BS should be used if the inlet water is preheated.
NOTE: Only the model 125B LPS or 125B NGS should be used if the inlet water is preheated.

3. Inlet filter screen is clogged, restricting flow
Remove screen and clean it.

WATER IS NOT HOT ENOUGH

1. Temperature selection is set too low.
Change the setting. Turn the temperature selector knob clockwise (to the right). **Note: this will decrease the activation flow rate.**

2. Gas pressure is insufficient
It is extremely important for a tankless instantaneous water heater to have the right size gas line to obtain the correct gas pressure. See specifications on page 2. Unlike storage tank water heaters, the burners of a tankless water heater must be very powerful to heat water instantaneously since they do this only at the time hot water is actually being used. It is therefore imperative that the gas pressure requirement be met exactly. Insufficient gas pressure will directly affect the water temperature at the time of usage. See page 3 for correct gas pressure settings and see page 11 for proper gas line sizing.

3. Gas supply is insufficient
Make sure your main gas line is fully opened. If using LP gas, be sure that the size of the propane tank is adequate to supply the required gas pressure. See gas pipe sizing chart on page 11.

4. Cold water is mixing with the hot water between the 425 EF and the outlet
Compare water temperature at outlet of the 425 EF (hold the 425 EF outlet pipe with your hand) and at the tap. If these two are very different, check for mixing valve or plumbing crossover (see "NO SPARK AT THE PILOT" paragraph 4). Where automatic "anti-scald" valves are required by code, lower the temperature setting on the 425 EF as much as possible and balance the pressure between cold and hot water after the 425 EF.

5. Parts in water valve are dirty or damaged, which will prevent the gas valve from being fully opened.
If the internal water valve parts are damaged from water quality or use, or there is evident corrosion where the water valve and gas valve connect, then immediate service is needed. See step 9 under the problem NO SPARK AT THE PILOT. White vinegar should be applied first to any corrosion before the loosening of screws.

HOT WATER TEMPERATURE FLUCTUATES / UNIT DEACTIVATED

1. Unbalanced pressure in waterlines
The added restriction caused by the 425 EF in the hot water system can result in uneven pressures between the cold and the hot. In such cases when mixing cold water at the tap, the lower hot water pressure may be overpowered by a much higher cold water pressure, which may cause the 425 EF burners to shut down (deactivate). Make sure faucet aerators or shower heads are free of minerals.
Do not add any flow restrictor to the shower head.
Typically this deactivation symptom is a result of the hot water being too hot to use comfortably. Warm inlet water generally causes this. Lowering the control knob setting and/or reducing the inlet gas supply to the heater should correct this deactivation symptom.

2. Temperature balance valves
If the inlet water temperature to the water heater is very warm the heater can produce temperatures that may be found to be too hot. A temperature balance shower valve can automatically mix in cold water to reduce such hot water temperature, in the event of any temperature instability with the use of a temperature balance shower valve, refer to shower valve manufactures instructions for internal adjustment setting. Adjustments should be made to the hottest setting in the shower valve. Additionally the temperature control of the heater can be adjusted to produce a more comfortable hot water temperature.
See **SETTING THE WATER TEMPERATURE** section.

3. Cold water is mixing with the hot water between the 425 EF and the outlet
See #4 under "NO SPARK AT THE PILOT".

4. Inlet water pressure is erratic due to inadequate supply water pressure or saturated pressure tank on well system
Check the inlet water pressure. For installation on a private well system with the use of a pressure tank, the lowest pressure range setting recommended is 30-50 psi (2.07-3.45 bar). Confirm that the pressure tank is not water logged.

5. Gas pressure is too low
See page 3 for correct specifications.

EXHAUST FAN DOES NOT OPERATE

1. Check the fuse (see fig 9)

2. Check all electrical connections

3. Check adjustment of microswitch (see Fig. 14)

FAN CIRCULATES WHEN HOT WATER IS SHUT OFF

1. Check adjustment of microswitch (see Fig. 14)

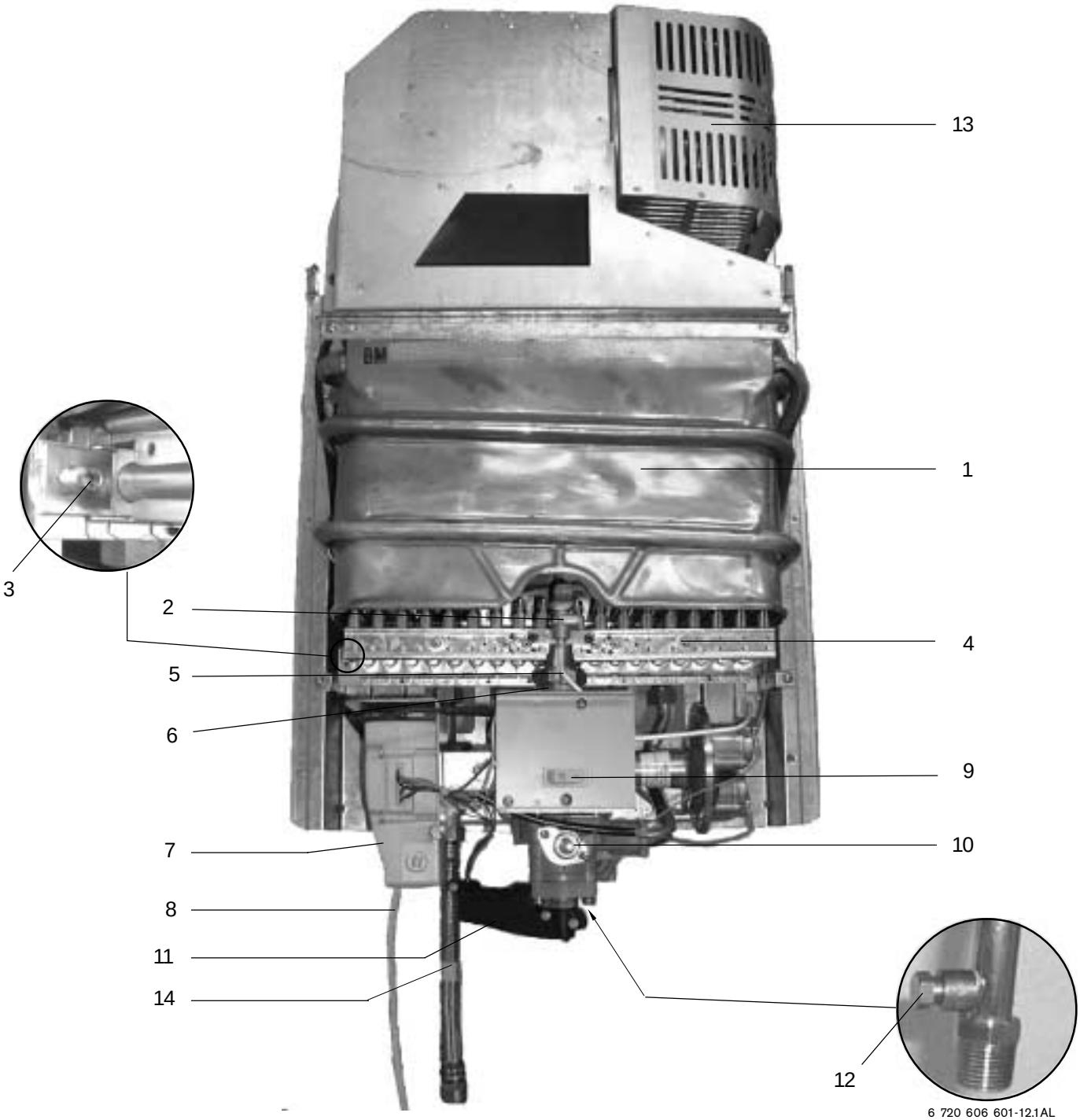
FAN OPERATES WITHOUT WATER FLOW

1. Unplug the heater and first check that all electrical and electronic connections in the heater are clean and tight.

2. Check adjustment of microswitch (see Fig. 14).

3. Control box may need to be replaced (see Fig 9).
Check wire connections and test operation of control box (see Fig 9).

Fig. 15 - Diagram of 425 EF



1. Heat exchanger
2. Pilot assembly
3. Burner manifold gas pressure test nipple
4. Main gas burner
5. Pilot gas tubing
6. Gas valve
7. electric control box
8. Power cord
9. on/off switch
10. Temperature adjustment selector
11. Microswitch
12. Gas inlet gas pressure test nipple
13. Exhaust Fan
14. Flexible hot outlet

Fig. 16 - INTERIOR COMPONENTS DIAGRAM AND PARTS LIST

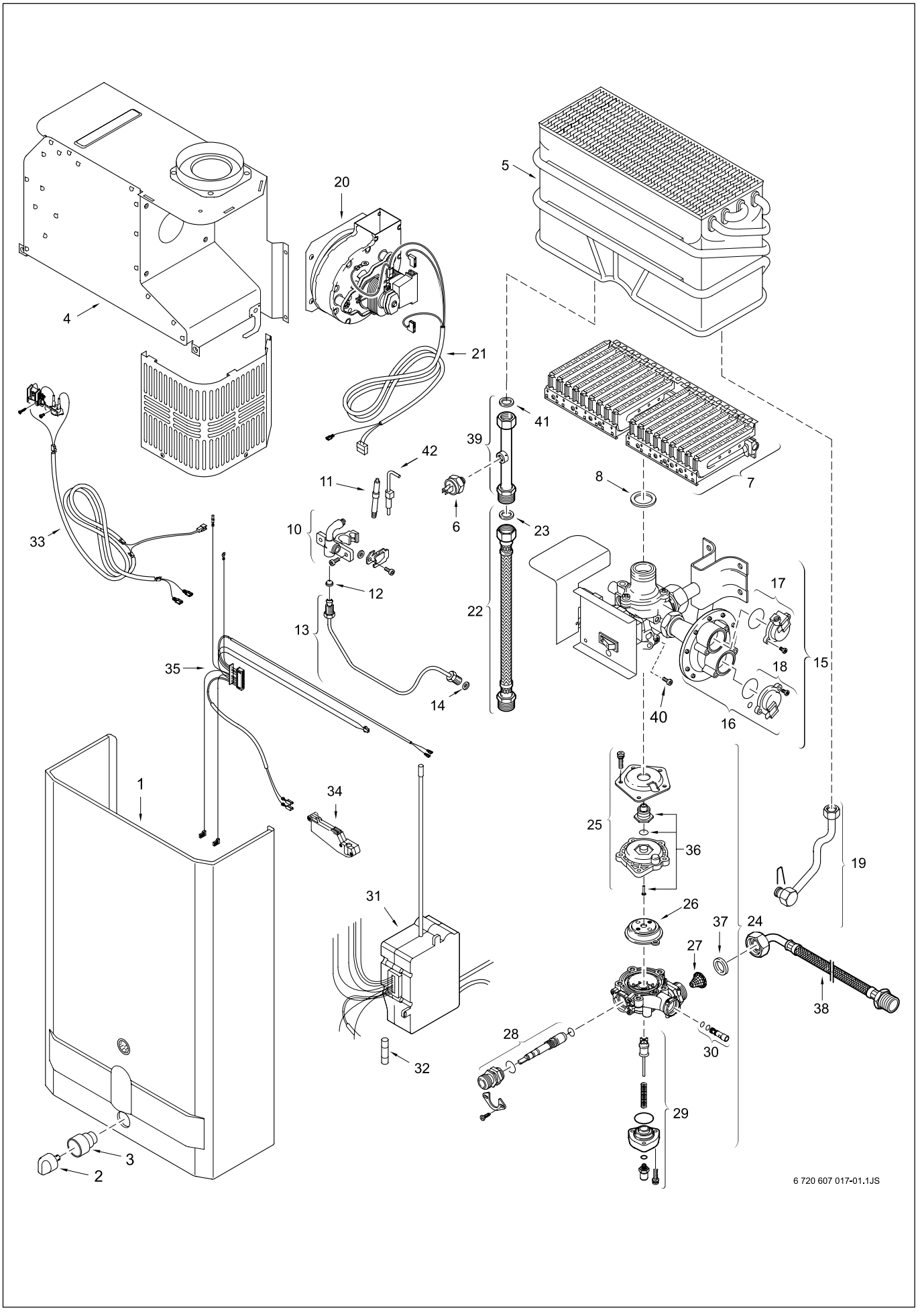
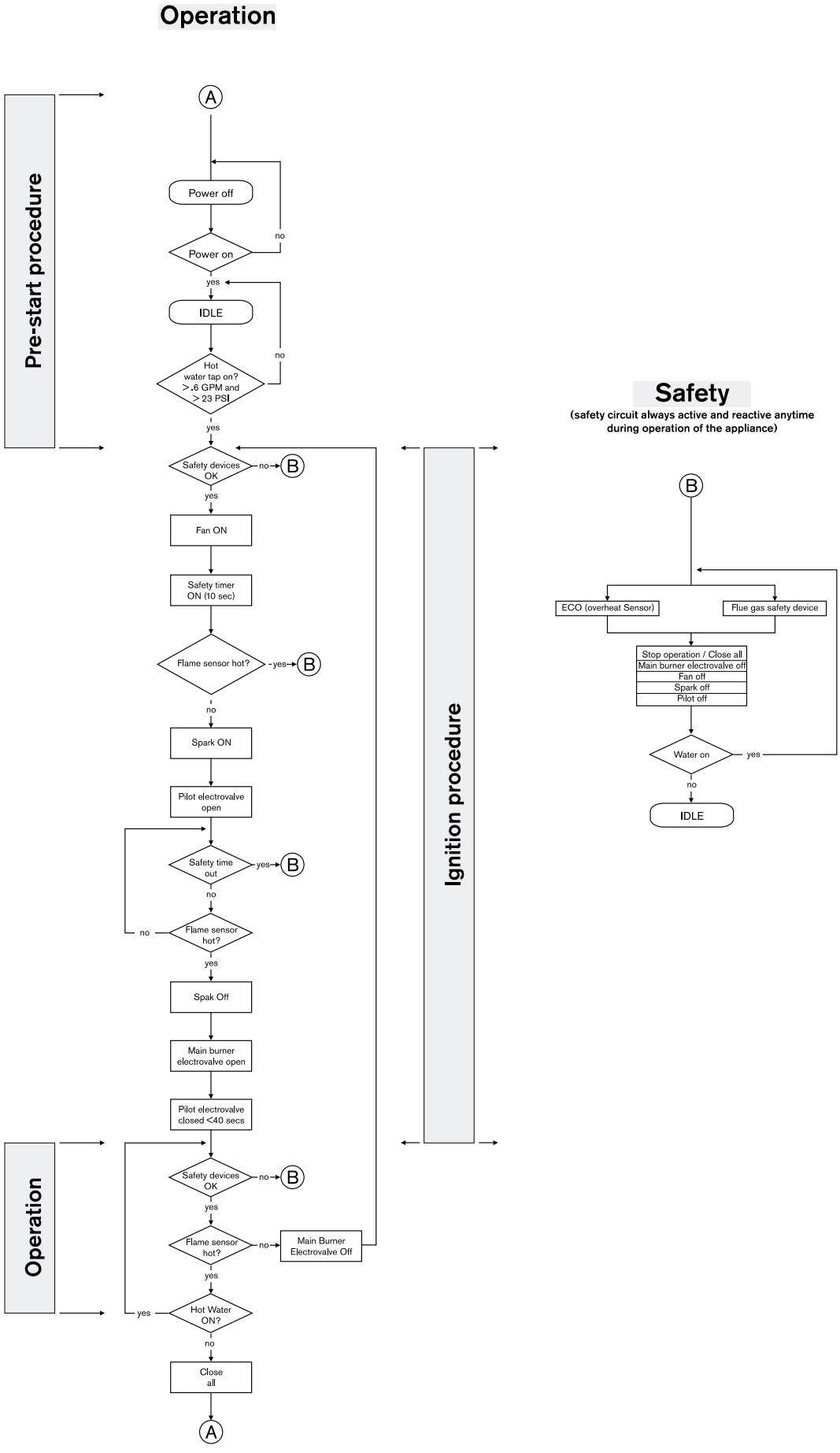


Fig. 16

INTERIOR COMPONENTS DIAGRAM AND PARTS LIST 425 EF

1	Cover	8 705 421 775	
2	Temperature adjustment knob	8 702 000 111	
3	Temperature adjustment collar	8 700 403 008	
4	Draft diverter	8 705 505 451	
5	Heat exchanger	8 705 406 235	
6	Overheat sensor (ECO)	8 707 206 040	
7	Main burner	8 708 120 298	NG
7	Main burner	8 708 120 296	LPG
8	Burner assembly washer	8 710 103 060	
10	Pilot burner	8 718 105 051	NG
10	Pilot burner	8 708 105 491	LPG
11	Piezo electrode	8 708 107 006	
12	Pilot injector	8 708 200 069	NG
12	Pilot injector	8 708 200 312	LPG
13	Pilot tube	8 700 707 349	
14	Washer pilot tube	8 700 103 173	
15	Gas valve	8 707 011 949	NG
15	Gas valve	8 707 011 950	LPG
16	Diaphragm switch	8 708 504 021	NG
16	Diaphragm switch	8 708 504 049	LPG
17	Pilot electrovalve	8 708 501 249	
18	Burner electrovalve	8 708 501 250	
19	Cold water pipe	8 700 705 627	
20	Exhaust fan assembly	8 707 204 023	
21	Exhaust fan cable	8 704 401 168	
22	Outlet flex hose	8 700 703 139	
23	Washer	8 700 103 658	
24	Water valve	8 707 006 361	
25	Water valve cover	8 705 500 101	
26	Diaphragm	8 700 503 092	
27	Water inlet filter	8 700 507 001	
28	Water valve selector screw	8 708 500 289	
29	Volumetric water governor	8 705 705 021	
30	Venturi	8 708 205 279	
31	Electric control box	8 707 207 106	
32	Fuse T2,5A	1 904 521 342	
33	Flue Gas Sensor	8 707 206 305	
34	Microswitch	8 707 200 007	
35	Set of cables	8 704 401 170	
36	Pushrod	8 700 306 114	
37	Washer connection gasket	8 710 103 043	
38	Water elbow fitting	8 700 703 114	
39	Connecting pipe hot	8 700 715 178	
40	Water valve set screw	8 703 401 051	
41	Washer	8 710 103 045	
42	Flame sensor	8 708 107 007	

Fig. 17 - Flow chart of 425 EF



Fifteen Year Limited Warranty

General
BOSCH PRO water heaters are warranted by the Manufacturer (BOSCH) through Controlled Energy Corp. Controlled Energy Corp. (CEC) will furnish a replacement heat exchanger and will furnish a replacement of any other part which fails in normal use and service within the applicable periods specified below, in accordance with the terms of this warranty. The CEC replacement will be warranted for the unexpired portion of the original warranty. This warranty will be valid only for water heaters in possession of the original purchaser as recorded on the warranty card.

The heat exchanger
If the heat exchanger fails within fifteen (15) years after the original installation and operation CEC will furnish a replacement heat exchanger. However, if the water heater is installed in other than a single family dwelling this heat exchanger warranty is limited to two (2) years from date of original installation and operation.

Exceptions
This warranty will not apply:
1. to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with the printed instructions provided;
2. to damage or abuse, accident, neglect or freezing and other acts of nature;
3. to damage resulting from operation with either the flame sensor rod or overheat sensor removed;
4. to failure of the heat exchanger resulting from the operation of the water heater in a corrosive atmosphere or at water temperatures exceeding the maximum rating, or if the water heater is not supplied with potable water;
5. to defects or damage cause by any attachment or modification, including any energy-saving device.

All other parts
If any other part fails within two (2) years after original installation and operation, CEC will furnish a replacement part free of charge.
Extended warranty is available to PHCC member contractors; however, all replacements are made subject to validation by CEC of in-warranty coverage.

Shipping costs
In addition to supplying the replacement part(s), CEC will provide ground service delivery for these parts. Expedited or upgraded shipping will be charged to the customer.

Service labor costs
This warranty does not cover any labor costs associated with service, removal or re-installation of part(s). All such costs must be borne by the Purchaser. Additionally, this warranty does not cover any labor costs associated with service, removal or re-installation of the original water heater or a replaced water heater.
Certain service labor allowances are available to PHCC member contractors, dependent on prior authorization by CEC.

NOTE : the water heater must be free of damaging scale deposits and not subject to gas pressures greater than those shown on the rating plate, which must not be altered, defaced or removed.

How to Make a Claim
Any claim for warranty parts should be made to your local dealer, distributor or to CEC. If CEC, please contact the Technical Support Department:

Controlled Energy Corp.
340 Mad River Park
Waitsfield, VT 05673
Phone: 866-330-2730
www.protankless.com

In most cases, the dealer or distributor will be able to promptly honor your claim and subsequently notify CEC. However, all replacements are made subject to validation by CEC of in-warranty coverage. The damaged or defective item must be made available in exchange for the replacement.

Miscellaneous
No one is authorized to make any other warranties on behalf of CEC. It is expressly understood that the replacement warranty of CEC shall be in lieu of any and all other warranties, express or implied, including warranties of merchantability or fitness for a particular use or purpose, and further that CEC shall not be liable for any loss or damage directly or indirectly arising from the use of the hot water heater, or for any consequential damages arising from such use (including damages from water leakage). CEC's sole liability with respect to any defect shall be for the replacement of the defective part(s). Some states do not allow such limitations and exclusions, so the above may not apply to you.
This warranty gives specific legal rights. You may also have other rights which vary from state to state.

MAINTENANCE TABLE see page 16			
	EVERY YEAR	EVERY 2 YEARS	EVERY 3-5 YEARS
LUBRICATE WATER VALVE		†	
REBUILD WATER VALVE			†
INSPECT WATER FILTER SCREEN	†		
INSPECT PILOT ASSEMBLY	†		
INSPECT VENT ASSEMBLY	†		
INSPECT MAIN BURNER	†		

Replacement Parts available from North American Distributor
CONTROLLED ENERGY CORP.
340 Mad River Park
Waitsfield, Vermont 05673
Phone 866-330-2730
Fax (802) 496-6924
www.protankless.com
techsupport@protankless.com

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